

USC Center for Applied Molecular Medicine and
USC Norris Westside Cancer Center

Dear Friends & Supporters,

I am pleased and honored to announce that Emmet and Toni Stephenson, together with their daughter Tessa Stephenson Brand, have donated \$10 million to create a provocative new program within the Center for Applied Molecular Medicine (CAMM) and the Westside Cancer Center (WCC), called the *Stephenson Family Personalized Medicine Center*.



Photo courtesy of UC Irvine

As most of you are aware, I expect great therapeutic advancements to arise through personalized medicine. When I say this, many people assume I am referring to sequencing cancer DNA. Although DNA sequencing is an important part of precision care, the new personalized medicine center will encompass much more. Our bodies are each a complex emergent system; reducing care decisions to DNA alone is a disservice to patients. If you were going to drive from Los Angeles to San Francisco and took apart a car, and examined every piece of the car, it wouldn't tell you how long it takes to get to San Francisco. You forgot to take into account the traffic, the weather, the bladder size of the driver and how much caffeine he drank! Looking at DNA alone is like only studying the car. We need to examine the whole system to get to real personalized medicine. The goal of our new program is to customize care based on as many parameters as possible, not just DNA. I hope to include metabolism, proteomic biomarkers, the microbiome and "squishiness of the cells" (as you will read later in the newsletter), among other factors.

I am eager to commence the Stephenson Family Personalized Medicine Center, both for what it can achieve for our patients today and for the knowledge it will provide about the most effective treatment options in the future. I am also delighted that Life Technologies/ Thermo Fisher Scientific and IBM Watson Health have joined the effort by providing access to their sequencing technology and cognitive and analytic technologies, respectively, to support this program for our patients.

I will have additional exciting announcements to share with you soon. As always, my enthusiasm and optimism are tempered with the reality that patients are still suffering. I hope to work with each of you to continue to make a difference *today* in the lives of those struggling with cancer.

With respect,



David B. Agus, MD

**Above photo: Dr. Agus, 2015 Commencement
Speaker for the University of California Irvine
School of Medicine*

Keck School of
Medicine of USC

Stephenson Family Personalized Medicine Center

As Dr. Agus announced in his letter (left), the donated resources from the Stephensons will further the pioneering efforts of our team to change the way cancer is viewed and treated and forge a path to personalized medicine.

The idea of personalized treatment has special meaning for the Stephenson family. Toni Stephenson has been battling T-cell lymphoma and Dr. Agus played an advisory role in developing her treatment regimen. His recommendation to try an experimental medicine specific to her condition proved crucial. "She's in clinical trial No. 1 for her kind of cancer using this particular drug," Emmet Stephenson said, noting that his wife's cancer has been in remission for about 18 months. "And it's terrific."

Using technology to improve medicine makes sense to the Stephensons, whose fortune was made in part from technology ventures. The creators of Domain.com, an Internet publishing empire, they also founded StarTek and operate Stephenson Ventures, a portfolio management and private equity company.

Tessa Brand, a 2002 graduate of the USC School of Cinematic Arts and founder of Tessa Lyn Events, L.L.C., a wedding and event planning company based in Brentwood, California expressed confidence in Agus' ability to envision a new way to approach cancer as a complex problem, rather than just a disease. "Dr. Agus is forward-thinking. He is thinking 100 years into the future," she said. "He plans to change the face of healthcare rather than solve a single problem. He thinks bigger than most people, and he is the type of person we want to support."

In Emmet Stephenson's view, the more information that a doctor has available, the better the decisions that will be made. And it is an immense undertaking. "There are over 400 kinds of cancer and over 7 billion people. That's a lot of possible combinations for personalized medicine," he said. "The thing that we hope will come from this donation is that other people will step up and help us. It's going to take a lot of resources and it's going to take a lot of smart people. We are honored to be a part of the team making an impact in this area."



Photo courtesy of Stephenson family

YOU CAN HELP TODAY!

Support our team and our ongoing cancer research here at WCC & CAMM. Simply return the enclosed envelope, call 310-272-7640, or visit us at: <http://keck.usc.edu/donateWCC>

We thank you in advance for your generosity!

*To opt out of CAMM/WCC mailings, please email wcc@med.usc.edu

New Device to be Tested at CAMM

Tumors come in all shapes, sizes, and squishiness. And it turns out that squishiness matters if you want to know how to treat tumors. USC engineers have created a backpack-sized instrument that can gently smush a wide range of materials accurately quantifying their Young's modulus - the scientific way to say "squishiness." Preliminary testing has found that in general more aggressive tumors are stiffer, but the complex relationship requires further research.

"The device leaves the sample completely undamaged, which allows researchers to still perform other tests on it," said Mark Harrison, USC Viterbi School of Engineering graduate student researcher and lead author of the study, which was published by *Applied Physics Letters* on May 14, 2015.

"Instruments able to measure a material's Young's modulus already existed, but they're large and require calibration each time they're moved," said Dr. Andrea Armani, USC Viterbi associate professor and corresponding author of the study, in announcing the device, which was created in collaboration with Harrison. "Our device could be carried from hospital room to hospital room and doesn't need an engineer to operate it."

Dr. Armani, a young global leader at the 2015 World Economic Forum, initially was inspired after a conversation with Dr. Agus, who told her that squishiness had recently been tied to a tumor's aggressiveness, but he lacked an easy-to-use device for testing that metric. "This advancement from Dr. Armani is so exciting, as we now have a new dimension of a tumor to measure. We are studying the role of Young's modulus together with her to help personalize and improve a cancer patient's care," said Dr. Agus.

"Given how safe, stable and accurate this instrument is, it could play a pivotal role in both diagnostic and research efforts, providing a rapid method for screening samples," Armani said.

Dr. Armani and Mark Harrison have applied for a patent and will next work with our CAMM team to test it in a clinical setting. In the future, they also hope to create a more sensitive version of the device that can map the squishiness across tumors.



Spotlight on Colleen Garvey, CAMM Research Assistant

Colleen is a graduate student at CAMM working under the mentorship of Dr. Shannon Mumenthaler. Her research investigates how the tumor microenvironment influences cancer evolution. She aspires to provide a better understanding of how environmental factors in tumors lead to cancer recurrence.

Tumor cell populations evolve similarly to the principles of Charles Darwin's Theory of Natural Selection. Darwin observed that species best suited to survive in their environments have a greater chance of passing their traits on to the next generation. Comparably, cancer cells which have advantageous traits for survival also become the cells that thrive and multiply. The environment of a tumor, also called the tumor microenvironment, is not uniform. Some regions lack adequate levels of oxygen, nutrients and other factors. Recent studies suggest that cells in these harsher environments may evolve to become more aggressive than cells in hospitable settings. Ultimately, Colleen hopes to study these factors to identify: (1) factors to target within the tumor microenvironment; and (2) more effective techniques to administer therapy in order to prevent malignancy from returning.

Originally from Massachusetts, Colleen graduated from Bates College in 2013 with a B.S. in Biochemistry and is currently enrolled in the Cancer Biology and Genomics Ph.D. program at USC. She joined CAMM in 2014 after being inspired by our multidisciplinary approach to fighting cancer. Colleen considers CAMM's training an invaluable asset toward her future career as a cancer researcher. When not in the lab, she enjoys exploring Los Angeles, which usually involves spending as much time at the beach as possible.

Empowering Future Thinkers

by: *Kian Kani, PhD*

The physical footprint of the WCC and CAMM is separated by a 15-mile stretch on the Wilshire corridor; however, the real footprint is much larger than these boundaries. Our vision at CAMM is to cultivate knowledge and empower trainees with the necessary know-how to optimize their success. A significant emphasis on mentorship and training has allowed CAMM to expand its area of influence. Over the past decade, our Center has trained hundreds of tomorrow's young physicians, scientists and engineers. We currently mentor high school students through the Jr. Fellows program, undergraduate students through university-directed research curriculum, and research associates through on-the-job training. Based on the accomplishments of our previous mentees, our mission is thriving.

For example, Paige Onouye, an alumna of the Jr. Fellows program, is currently a neuroscience major at St. Andrews University in Scotland. She actively participates in research, starts on the school's basketball team, and volunteers at various medical clinics in Africa during summer break. Paige, along with many other Jr. Fellows alumni, has incorporated our guiding principles to enrich lives and change the world. Another trainee, Vishnu Rao, is a third year undergraduate research volunteer at CAMM under the mentorship of Dr. Shannon Mumenthaler. Vishnu presented his work at the Physical Sciences and Oncology Symposium and will be a co-author on a number of publications. He is currently applying to M.D./Ph.D. programs while studying digital photography in his spare time.

In some cases, trainee success fosters growth from within our program. Dr. Katherin Patsch began her post-doctorate training at CAMM in 2012. She quickly transitioned to research scientist as result of her outstanding accomplishments and passion for research. Under the guidance of Dr. Dan Ruderman, she has been instrumental in establishing our DNA sequencing platforms which will be used to predict cancer evolution.

Our Center continues to evolve but our dedication to foster future brilliant minds through mentorship remains constant. Former alumni understand that CAMM's philosophy must grow through them in order to imprint on the minds of the next generation of scientists. With the help of these alumni, our Center will continue to increase our scientific footprint.